

How to Write Arithmetic and Algebra

By Means of the Joint Type Method

By

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THE ARITHMETIC AND ALGEBRA BOARD

















ARITHMETICAL and Algebraical Calculations may be made by the Braille System, but where the Calculating Board is used, that invented by the Rev. W. Taylor is recommended, of which the following brief descriptive explanation is given :—

The holes in the Board are star-shaped, with eight angles, thus allowing the square Types—of which there are two kinds, Type I and Type II—to be placed each in sixteen different positions, eight in Position *a*, and eight in the reverse Position *b*.



The following is a detailed list of the various Positions of the two Types, together with the corresponding uses assigned to them :—

TYPE I	
Position <i>a</i>	Position <i>b</i>
 1	 9
 2	 0
 3	 +
 4	 —
 5	 ×
 6	 ÷ and Ratio
 7	 Decimal Point
 8	 = and Recurring Period

TYPE II	
Position <i>a</i>	Position <i>b</i>
 A	 (
 B	 [
 C	 Index Sign
 D	]
 X	)
 Y	 }
 Z	 Radical Sign
 For occasional purposes	 {

ADDITIONAL USES.—For Trigonometry, the first six positions of Type II (*b*) may be used respectively for Sine, Cosine, Tan., Cosec., Sec., Cotan.

Handwritten notes:
 1. ✓ 1/6
 2. ✓ 1/4
 3. ✓ 1/2
 4. ✓ 3/4
 5. ✓ 5/6
 6. ✓ 1

ADDITION.

With Type this becomes :—

Add 1918

246

57

403

94

2718



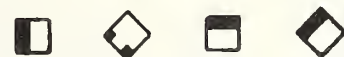
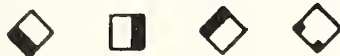
SUBTRACTION.

With Type this becomes :—

From Km. Hm. Dm. M.
4 5 8 2

Take 1 6 3 9

2 9 4 3



MULTIPLICATION

Multiply £27 7s. 10½d. by 35

£ s. d.
27 7 10½
5

136 19 3½
7

£958 14 10¾

With Type this becomes :—



DIVISION

Divide 97.384 by 37.6

$$376 \overline{) 973.84(2.59}$$

$$752$$

$$221.8$$

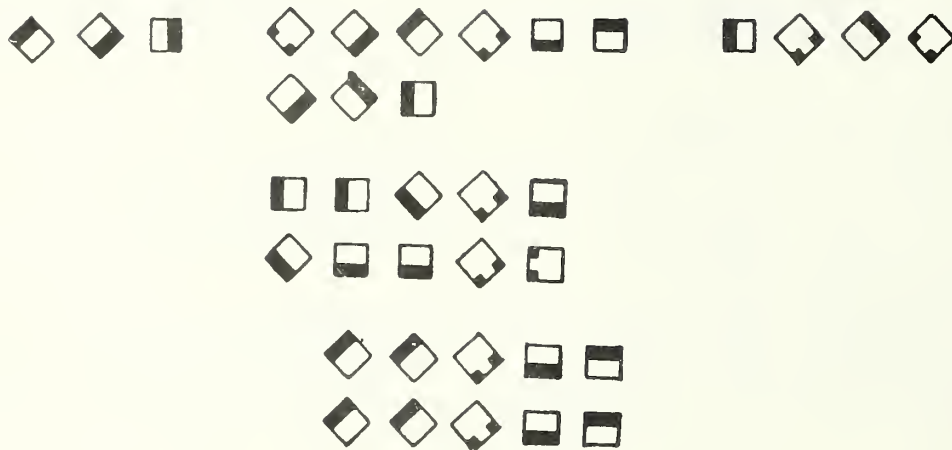
$$188.0$$

$$33.84$$

$$33.84$$

$$\dots$$

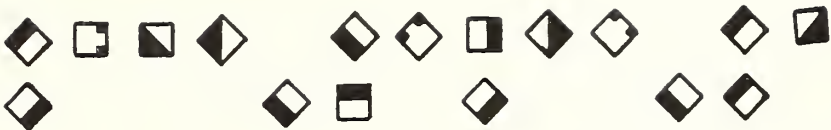
With Type this becomes :—



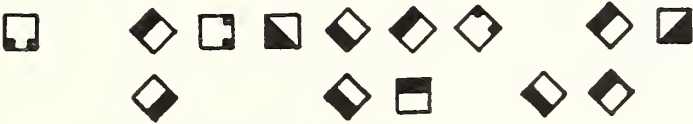
SIMPLE BRACKETS

With Type this becomes :—

$$\frac{3}{7} \div \left\{ \left(\frac{1}{14} + \frac{6}{7} \right) \times \frac{3}{13} \right\}$$



$$= \frac{3}{7} \div \left\{ \frac{13}{14} \times \frac{3}{13} \right\}$$



$$= \frac{3}{7} \div \frac{3}{14}$$



$$= \frac{3}{7} \times \frac{14}{3}$$



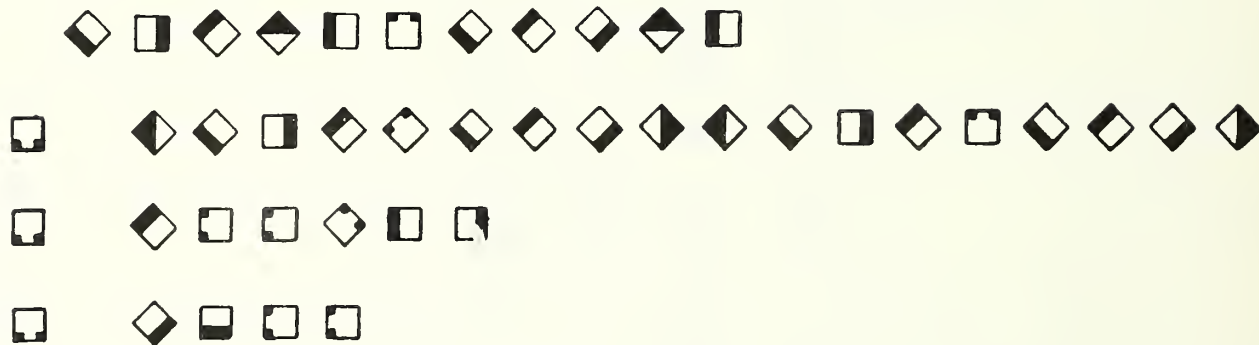
$$= 2$$



POSITIVE INTEGRAL INDEX

$$\begin{aligned}
 &163^2 - 137^2 \\
 &= (163 + 137) (163 - 137) \\
 &= 300 \times 26 \\
 &= 7800
 \end{aligned}$$

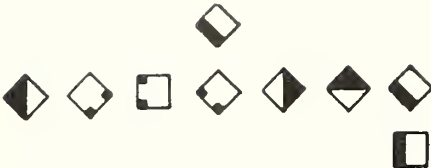
With Type this becomes :—



FRACTIONAL AND NEGATIVE INDEX

With Type this becomes :—

$$(.09)^{-\frac{1}{2}} = \frac{1}{(.09)^{\frac{1}{2}}}$$



$$= \frac{1}{\sqrt{.09}}$$



$$= \frac{1}{.3}$$



$$= 3.\dot{3}$$



DECIMALS, RECURRING DECIMALS AND FRACTIONS

With Type this becomes :—

$$8.\dot{1}6 \times 3.\dot{1}4285\dot{7} \div 2.2$$

$$= 8\frac{1}{6} \times 3\frac{1}{7} \div 2\frac{1}{5}$$

$$= \frac{49}{6} \times \frac{22}{7} \times \frac{5}{11}$$

$$= \frac{35}{3} = 11\frac{2}{3}$$

$$= 11.\dot{6}$$

UNITARY METHOD

If A men earn £B in C days, in how many days will X men earn £Y ?

With Type this becomes :—

A men earn £B in C days



1 man earns £B in AC days



X men earn £B in $\frac{AC}{X}$ days



X men earn £1 in $\frac{AC}{BX}$ days



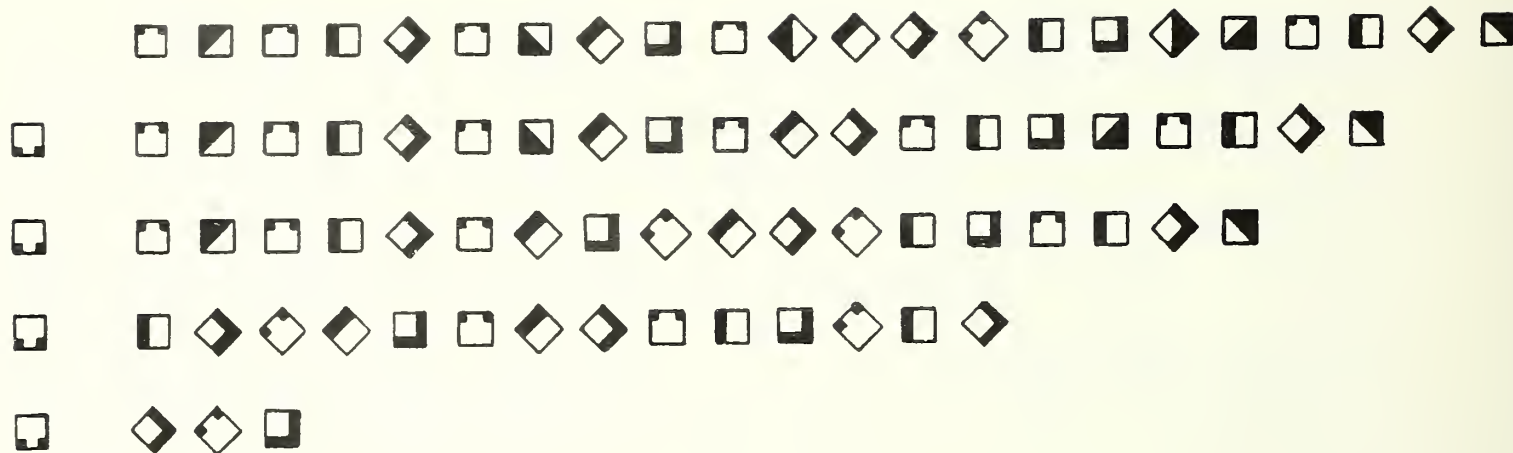
X men earn £Y in $\frac{ACY}{BX}$ days



ALGEBRA BRACKETS

$$\begin{aligned}
 &= - [- 2x - \{ 3y - (3x + 2y) \} - 2x] \\
 &= - [- 2x - \{ 3y - 3x - 2y \} - 2x] \\
 &= - [- 2x - 3y + 3x + 2y - 2x] \\
 &= 2x + 3y - 3x - 2y + 2x \\
 &= x + y
 \end{aligned}$$

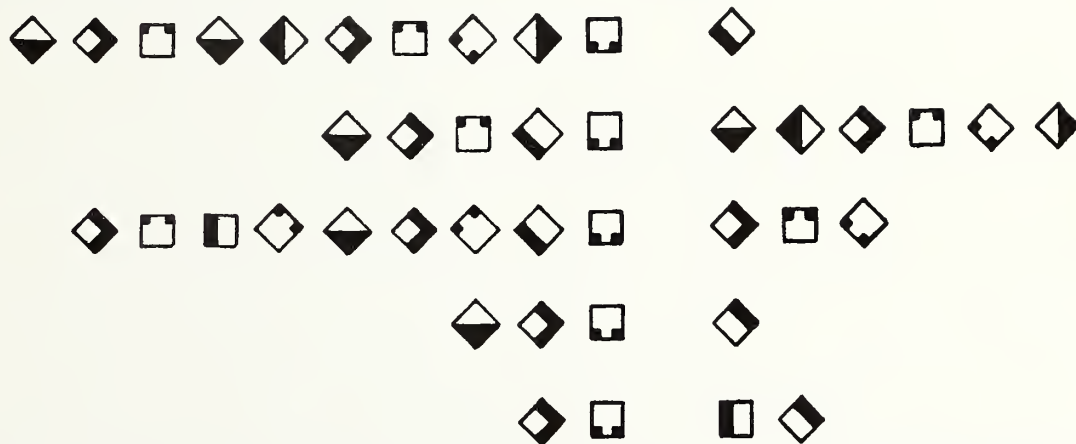
With Type this becomes :—



ALGEBRA EQUATIONS

$$\begin{aligned} \sqrt{x} - \sqrt{x-9} &= 1 \\ \text{Transposing } \sqrt{x} - 1 &= \sqrt{x-9} \\ \text{Squaring } x - 2\sqrt{x} + 1 &= x - 9 \\ \text{Therefore } \sqrt{x} &= 5 \\ x &= 25 \end{aligned}$$

With Type this becomes :—



Note carefully the use of the Radical Sign with the type. It must be separated from a Numerical Co-efficient by the sign for Multiplication, otherwise the figure would indicate the root desired. When not preceded by such figure it represents "Square Root."

Example :—" Four times the Square Root of 81 " and the " Fourth Root of 81."

LITERAL INDEX

With Type this becomes :—

$$X^{a-b} \times X^{b-a}$$



$$= X^{a-b+b-a}$$



$$= X^0$$



$$= 1$$



NOTE.—When an Index consists of two or more terms, such Index must, in the Braille System as well as in the Joint Type Method, be enclosed in Brackets (see Ex.).

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